REMARKS

This is in response to the Office Action mailed on March 30, 2006, in which all claims 1–31 were rejected.

I) Objection to the Specification

The paragraph indicated in the Amendments section was amended to include a period as indicated in the Office Action.

II) Objections to the Claims

Claims 1 and 12 were objected to based on informalities. Specifically, Claim 1 was objected to for lack of antecedent basis for the phrase "anisotorpy field distribution and volume distribution values." Claim 12 was objected to for awkward phrasing. Claims 1 and 12 have been amended to address these objections. Claim 23 has also been amended to correct a misspelling of the word "susceptibility."

III) Rejections to the Claims

a) Section 112 Rejection

Claims 1-31 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Specifically, the Office Action asserts that the claims contain "subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventor(s), at the time the application was filed, had possession of the claimed invention."

In order to establish a prima facia case for a Section 112, first paragraph rejection, it is necessary for the Examiner to (1) identify the claim limitation at issue; and (2) establishing a prima facia case by providing reasons why a person skilled in the art at the time the application was filed would not have recognized that the inventor was in possession of the invention as claimed in view of the disclosure in the application as filed. (MPEP § 2163.III.A.) The Examiner has the initial burden of showing why a person skilled in the art would not recognize that the written description of the invention provides support for the claims. (See MPEP § 2163.II.A.) An adequate written description of the invention may be shown by any description of sufficient, relevant, identifying characteristics so long as a person skilled in the art would recognize that the inventor had possession of the claimed invention. (MPEP § 2163.II.A.3(a).) Possession of the invention may be shown by sufficiently detailed drawings. (Id.)

The Office Action states that (1) "while the imaginary components of AC susceptibility may have a differing sensitivity to σ_V and σ_{HK} at high and low DC fields, it is not clear how this allows a computer to derive separate values by curve fitting."; (2) "[I]t is not clear how σ_V and σ_{HK} are derived."; (3) "[I]t is not clear how V and HK are solved…."; (4) "[I]t is not clear how the parameter V and H_K leads to σ_V and σ_{HK} being solved."; and (5) "[t]he relation between σ_V and σ_{HK} and V and H_K is unclear."

The Examiner thus fails to make a prima facia case as to why the written description does not support the claims. First, the Office Action does not identify specific claim limitations in Claims 1-31 at issue. The Office Action summarily rejects all Claims 1–31 in stating that it is unclear how σ_V and σ_{HK} are derived. The Office Action does not assert how the present invention is unsupported by the specification, but merely asserts that portions of the specification are unclear.

Second, the Office Action does not explain why a person skilled in the art would not have recognized that the inventor was in possession of the invention based on the disclosure. The Office Action merely states that the specification is unclear, without explaining why one skilled in the art would not be able to recognize possession of the invention.

For example, the Office Action states that it is not clear how the parameters V and H_K lead to σ_V and σ_{HK} being solved, or how V and H_K relate to σ_V and σ_{HK}. The specification, however, states that the grain size distribution σ_V is the distribution of volume V. (App. Page 2, Line 10.) Correspondingly, anisotropy filed distribution σ_{HK} is the distribution of the anisotropy field HK. (App. Page 12, Lines 2-8.) The relationship between a parameter and its distribution within a sample is well known in the art and the Office Action fails to explain why a person skilled in the art would not be able to recognize this relationship.

Additionally, The Office Action states that it is not clear how the differing sensitivity of σ_V and σ_{HK} to different DC field strengths allows a computer to derive separate values by curve fitting. The Office Action, however, refers to the relevant parts of the specification relating to curve fitting without explaining why a person skilled in the art would not be able to recognize how a computer could be used to solve for σ_V and σ_{HK} using a fitting technique.

As the Office Action has correctly noted, the specification makes reference to using a curve fitting technique to solve an equation for two unknown variables. (App. Page 10, lines 8-10.) Equation (6) of the application includes several variables including (1) the imaginary component of susceptibility, (2) the DC field strength, (3) the AC field strength, (4) grain volume V, and anisotropy HK. Of these variables, only V and HK are unknown. (App. Page 13, lines 12-14.) In contrast, the imaginary component of susceptibility is measured. (App. Page 10, Lines 3-7; App. Page 14, Lines 3-4.) The DC field strength and AC field strengths are known parameters. (App. Page 13, Lines 16-18.) Thus, using a curve fitting technique and the recognition that σ_V and σ_{HK} have different sensitivities to the imaginary component of AC susceptibility, the parameters V and HK can be mathematically derived.

The specification of the present application refers to FIG. 2B where it demonstrates and explains the curve fitting technique used in the present invention. (App. Page 15, Lines 15-20.) As noted earlier, the specification including detailed drawings is sufficient to show that the inventor was in possession of the invention. FIG. 2B shows the fitting of the volume distribution and anisotropy distribution from the imaginary part of the complex transverse susceptibility. (App. Page 15, lines 11 – 13.) The circular data points represent measured values of the imaginary component of transverse susceptibility at different DC field strengths. The curve fits are shown plotted over the data points with various line types. The anisotropy field and grain diameter (volume) parameters are shown as ratios, such as σ_{HK} /HK. (App. Page 15, Line 17.) By supplying anisotropy field and volume parameters to the equation of interest, such as Equation [6], the derived transverse susceptibility can be compared to the experimental data. The parameters can be manipulated until the selected parameters “fit” the experimental data. However, due to the differing sensitivity of the imaginary component of transverse susceptibility to anisotropy field and volume, either one of anisotropy field or volume parameters can be estimated or ignored at different parts of the curve because the equation governing the curve is not dominated by that parameter at that portion. Thus, the other parameter can be accurately interpolated, not estimated, by “fitting” it to the curve.

On the left side of the curve in FIG. 2B, at values of H_{DC} below about 7.5 kOe, the unknown parameter HK can be estimated since at low DC field strengths the imaginary component of complex transverse susceptibility is less sensitive to the anisotropy field. (App. Page 15, lines 13 – 15.) As shown in FIG. 2B by the plots of different combinations of grain volume values and anisotropy field values, below DC field strengths of about 7.5 kOe the anisotropy field value can be varied (from 0.06 to 0.12) without affecting the curve fit to the data points of the imaginary component of susceptibility. Variation of the grain volume value, however, affects the fit of the curve to the data points. For volume values of 0.23 and 0.18 it can be seen the curve fit data strays furthest from the experimental data. The volume distribution value of 0.27, regardless of the anisotropy field value, tracks the experimental data closely. Thus, FIG. 2B shows that the differing sensitivity of the imaginary component of susceptibility to V and HK at differing DC field strengths allows a curve fitting technique to solve for V.

The same process is repeated on the right side of the curve for values of DC field strengths above about 7.5 kOe. On the right side of the curve in FIG. 2B, at values of H_{DC} above about 7.5 kOe, the unknown parameter V can be estimated since at high DC field strengths the imaginary component of complex transverse susceptibility is less sensitive to the grain volume. (App. Page 15, lines 15 – 20.) As shown in FIG. 2B by the plots of different combinations of grain volume values and anisotropy field values, above DC field strengths of about 7.5 kOe the volume value can be varied (from 0.0.18 to 0.27) without affecting the curve fit to the data points of the imaginary component of susceptibility. Variation of the anisotropy field value, however, affects the fit of the curve to the data points. For anisotorpy field values of 0.12 and 0.06 it can be seen the curve fit data strays furthest from the experimental data. The anisotropy field value of 0.09, regardless of the volume value, tracks the experimental data closely. Thus, FIG. 2B shows that the differing sensitivity of the imaginary component of susceptibility to V and HK at differing DC field strengths allows a curve fitting technique to solve for HK.

The Office Action fails to explain why a person skilled in the art would not be able to recognize the fitting technique used in the invention based on the description in the specification. Thus, the rejection of the application based on Section 112, first paragraph is not supported and the rejection to Claims 1 - 31 should be withdrawn. A notice to that effect is respectfully requested.

b) Section 103 Rejections

All independent claims, including Claims 1, 13, 23 and 24, were rejected based on Section 103(a) as being obvious in view of Papusoi, Jr. and Thin Films Magnetic Research ("TFMR"). Additionally, all of the dependent claims were rejected based on Papusoi, Jr., TFMR and other cited references. In particular, the Office Action asserts that Papusoi Jr. discloses deriving the anisotropy field distribution and volume distribution values. However, Papusoi, Jr., and any combination of the cited references, fails to teach ~~a~~ key aspects of the present invention, including deriving the anisotropy field distribution and volume distribution values, as is required in Claims 1, 13, 23 and 24 and new independent Claims 42 and 46.

One of the inventive aspects of the present invention is the deriving of separate values for anisotropy field distribution and volume distribution, whereas in the cited references these values are typically convoluted and can, therefore, not be accurately determined. (App. Page 5, Lines 12-14; App. Page 10, Lines 11-15.) The present invention is able to deconvolute the anisotropy field distribution and volume distribution values based on the differing sensitivity of the imaginary component of the measurement signal to anisotropy field and volume at different DC field strengths, as was not recognized in the cited references. (App. Page 10, Lines 7-10; App. Page 15, Lines 15-20.)

Claim 1 requires "deriving anisotropy field distribution and volume distribution values based upon the real and imaginary components" of the measurement signal. Claims 13 requires that "separate anisotropy field distribution and volume distribution values" be derived "based upon differing sensitivity of the imaginary component of the measurement signal" at different DC field strengths. Claim 23 requires that "separate values of anisotropy field distribution and volume distribution" be derived "based upon a relationship of an imaginary component of AC transverse susceptibility to different DC field strengths." Claim 24 requires "deriving separate anisotropy field distribution and volume distribution values based upon differing sensitivity of the imaginary component of the measurement signal to anisotropy field and volume at different DC field strengths."

Thus, independent Claims 1, 13, 23 and 24 require that separate anisotropy field and volume distributions be derived from a measurement signal using at least an imaginary component thereof. An explanation of the invention, as supported by the specification, has been supplied above in addressing the Section 112 rejection. That explanation also illustrates one inventive aspect of the present invention and why the cited references fail to teach the present invention.

With reference to independent Claims 1, 13, 23 and 24, the Office Action asserts that Papusoi, Jr. teaches "deriving anisotropy field distribution and volume distribution values based upon the real and imaginary components and magnitudes of the AC and DC fields ((Figures 3-9) and (Page 391, Lines 5-6 of the Abstract) and (Page 399, Lines 11-15 and equations (19) and (20) and (Page 397, Lines 9-12) and (Page 401, Lines 11-23))."

Papusoi, Jr., at page 397, lines 9-12 and figures 3-9, shows plots of curves that show the real and imaginary components of transverse susceptibility as functions of DC field strength and the polar coordinate ψ of the easy axis. Figures 3-6 are plots of equations (11) and (12) (with $\psi = (\theta, \varphi)$) and illustrate the point that "transverse susceptibility is dominated by the behavior of the particle having the easy axis perpendicular to the DC field ($\psi = 90^\circ$)." (Papusoi, Jr. Page 395, Lines 23-24; Page 397, Lines 6-7.) Figures 7-9 are also plots of transverse susceptibility along with harmonic and phase data, and show simulated data. (Papusoi, Jr. Page 397, Lines 18-26.) Papusoi, Jr. fails to disclose how to obtain actual values for σ_V and σ_{HK} from a sample based upon what is taught in figures 3-9 or equations (11) and (12). Conversely, the presently claimed invention requires that σ_V and σ_{HK} be obtained from a magnetic sample. For example, Claim 1 requires "deriving anisotropy field distribution and volume distribution values." Thus, Papusoi, Jr. fails to teach every element of the presently claimed invention.

Papusoi, Jr., at page 391, lines 5-6 of the abstract, merely states that the procedures described in Papusoi, Jr. yield results that may be useful in determining parameters such as particle volume and anisotropy field distributions, without an explanation of how to do this. Thus, the abstract does not teach how to derive actual values for anisotropy field distribution and volume distribution. Conversely, the presently claimed invention requires that σ_V and σ_{HK} be derived. Particularly, Claim 1 requires "deriving anisotropy field distribution and volume distribution values." Thus, Papusoi, Jr. fails to teach every element of the presently claimed invention.

Papusoi, Jr., at page 399, lines 11-15 and equations (19) and (20), shows and discusses equations that relate real and imaginary components of transverse susceptibility to volume and anisotropy field distribution without explaining how to solve these equations for both the volume and anisotropy field distributions when each of these components is not known. In fact, Papusoi, Jr. indicates that the equations were solved in producing Figures 11 and 12 using the "most probable values" for volume and anisotropy field distributions. (Papusoi, Jr. Page 399, Lines23-26.) Thus, Papusoi Jr. at page 399 and equations (19) and (20) does not indicate how to solve an equation for two unknowns to accurately determine anisotropy field distribution and volume distribution without guessing at their values. Papusoi, Jr. does not explain how to isolate one parameter from the other as is done in the present invention. Conversely, the presently claimed invention requires that separate values for σ_V and σ_{HK} be obtained. For example, Claim 23 requires "deriving separate values of anisotropy field distribution and volume distribution based upon a relationship of an imaginary component of AC transverse susceptibility to different DC field strengths." Thus, Papusoi, Jr. fails to teach every element of the presently claimed invention.

Papusoi Jr., at page 401, lines 11-23 discusses attempts at deconvoluting anisotropy and volume distributions in order to determine particle anisotropy and volume distributions based on previous attempted methods. (Papusoi, Jr. Page 401, Lines 7-8.) These attempts, however, result in convoluted anisotropy and particle volume distributions and require an associated knowledge of the particle volume distribution itself. (Papusoi, Jr. Page 401, Lines 9-11.) Thus, Papusoi, Jr. at page 401 indicates that Papusoi, Jr. does not teach how to deconvolute the volume and anisotropy field distributions, and hence, their values cannot be determined with any of the equations taught in Papusoi, Jr. without taking the further, inventive steps of the present invention. The presently claimed invention requires that separate values for σ_V and σ_{HK} be obtained. For example, Claim 23 requires "deriving separate values of anisotropy field distribution and volume distribution." Thus, Papusoi, Jr. fails to teach every element of the presently claimed invention.

Papusoi, Jr. fails to disclose how to derive separate values for anisotropy field distribution and volume distribution, as is required in Claims 1, 13, 23 and 24. The Office Action combines the teachings of Papusoi, Jr. with various references that do not discuss anisotropy field distribution or volume distribution. For example, in rejecting the independent claims, Papusoi, Jr. is combined with Thin Films Magnetic Research ("TFMR"). TFMR, however, fails to disclose anything regarding analysis of measurement signals, transverse susceptibility or curve fitting and thus does not teach any of the above discussed inventive aspects of the invention. TFMR merely shows a picture of a magneto-optical Kerr effect measurement system without any discussion of measuring or determining grain volume distribution and anisotropy field distribution. Thus, the combination of Papusoi, Jr. and TFMR fails to disclose every aspect of the presently claimed invention, specifically, deriving separate values for anisotropy field distribution and volume distribution.

In rejecting the dependent claims, the Office Action further cites to other references, none of which discloses the claimed elements of the present invention. Specifically, the cited Soffge article reference, and Itoh et al., Jacobs et al. and Sugitani patent references fail to discuss deriving grain volume distribution and anisotropy field distribution as is claimed in the present invention. For example, Claims 13 and 24 require "deriving separate anisotropy field distribution and volume distribution values." Thus, even combining Papusoi, Jr. with the other cited references fails to teach every element of the presently claimed invention, namely, deriving separate values for anisotropy field distribution and volume distribution.

Papusoi, Jr., even when combined with the cited references, does not teach or disclose the presently claimed invention, including every element of independent Claims 1, 13, 23 and 24. Claims 1, 13, 23 and 24 are therefore patentable over the cited references and rejections to those claims should be withdrawn. Additionally, all dependent claims depending from the independent claims are likewise patentable over the cited references, and rejections of those claims should also be withdrawn. New Claims 32 – 41 also depend from independent Claims 1 and 24 are therefore also allowable. Additionally, new independent Claims 42 and 46 include the above-discussed elements relating to deriving separate values for anisotropy field and volume distributions that are not previously disclosed in the cited references and are therefore allowable. A notice to that effect is respectfully requested.

CONCLUSION

This is in response to the Office Action mailed on March 30, 2006, in which all claims 1–31 were rejected. With this Amendment, independent Claims 1, 13, 23 and 24, and New independent Claims 42 and 46 are allowable over the cited references. Therefore, dependent Claims 2-12, 14-22 and 25-31 are also in condition for allowance. New Claims 32-41, depending from allowable independent Claims 1 and 24, are also allowable. A notice to that effect is respectfully requested.

Respectfully submitted,

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By:
David R. Fairbairn, Reg. No. 26,047
THE KINNEY & LANGE BUILDING
312 South Third Street
Minneapolis, MN 55415-1002
Telephone: (612) 339-1863
Fax: (612) 339-6580